# Which Firms Benefit More from Financial Development?

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# **MOTIVATION**

There is positive cross-country correlation between financial development and economic activity (Goldsmith, 1969; King & Levine, 1993) and several possible causal channels underlying it, running both ways.

#### One channel supported both theoretically and empirically

#### FINANCIAL DEVELOPMENT

- $\Rightarrow$  Overcomes market frictions (asymmetric information or moral hazard)
- $\Rightarrow$  Lowers external finance costs (constraints)
- $\Rightarrow$  Leads to more use of external finance and higher corporate growth
- Finance theory: External finance costs arise as a consequence of market frictions (asymmetric information).
- Survey evidence: Small and young firms report to be constrained in access to external finance.

## PROPOSAL

- Take company size and age as an effective proxy for the extent of information asymmetry firms face (Berger et al., 2001, 2002).
- Small and young firms should benefit disproportionately from financial system becoming more efficient ( = financial development).

#### We ask whether this is the case.

- Relevance: WB, EU or EBRD spend \$s to support SME growth.
- Rajan & Zingales (1998) asked about the difference in the financegrowth effect across industries. We apply their strategy at firm-level.

#### **THE RAJAN & ZINGALES IDENTIFICATION STRATEGY**

- 1. External finance more costly than internal.
- 2. US measure of industry external finance dependence (EFD) describes industry external finance need in all countries (Zimbabwe).
- 3. Regress industry-country growth on
  - Country and industry fixed effects
  - An interaction term EFD<sub>INDUSTRY</sub> \* Financial\_Development<sub>COUNTRY</sub>

to ask whether industries in more need of external finance grow faster in financially more developed countries conditional on all (potentially unobservable) country- and industry-specific factors affecting growth.

#### THIS PAPER: THE RAJAN & ZINGALES STRATEGY AT FIRM LEVEL

1. Financial development helps disproportionately those firms that face higher external finance costs or tighter financial constraints.

But valid firm-level measures of costs (constraints) are hard to come by.

- 2. So use firms' age or size as a proxy for information asymmetry, which gives rise to external finance costs (constraints).
- 3. Regress corporate growth on
  - Country and industry fixed effects
  - An interaction term (Age or Size)<sub>FIRM</sub> \* Financial\_Development<sub>COUNTRY</sub>

to ask whether younger / smaller firms grow faster in financially more developed countries conditional on all country and industry factors.

#### THIS PAPER VALUE ADDED

#### • *Mechanism* of finance-growth effect

RZ (1998): External finance is more costly than internal.

External finance need varies exogenously at industry level (technology + growth opportunities).

This paper: Firms need external finance.

External finance costs increase with firm's opaqueness, which can be proxied by size and age.

#### Other advances

Study EU-15 firms: (i) technologically comparable, (ii) similar growth opportunities, (iii) same product market regulation, (iv) different financial systems.

Alternative proxies for information asymmetry—absolute or relative to allow for different screening techniques of financial intermediaries.

Compare results based on alternative sources of variation.

#### **BASIC SPECIFICATION**

$$G_{ijk} = \alpha + \beta (FD_k * Z_{ijk}) + \eta Z_{ijk} + \delta_j + \gamma_k + X_{ijk}'\zeta + \varepsilon_{ijk}$$

- $G_{ijk}$  Avg. growth of firm *i* in industry *j* in country *k* during 1995-2003
- FD<sub>k</sub> Financial development indicators: Private credit, Stock market capitalization, Total capitalization, Stock market value traded, Accounting standards, 1990-1994 average.
- $Z_{ijk}$  Firm size or age.
- $\delta_j \gamma_k$  Industry and country dummies.
- *X<sub>ijk</sub>* ' Firm-specific initial-period characteristics: Leverage, Tangibility, Collateral, Trade credit, Legal form, Listed, Ownership concentration.

# DATA

## **Firm-level**

- Amadeus 'TOP 250 thousand' for EU-15
- Real value-added growth of manufacturing firms
- Only public and private limited liability companies
- Remove state-owned firms
- Best firm-level EU data source available to date (Gomez-Salvador, 2004; Klapper et al., 2006, Guiso et al., 2004)

# **Country financial development indicators**

- World Bank Financial Structure and Economic Development
  Database
- Total capitalization: Includes debt securities (Hartmann et al., 2006)

# FINANCIAL DEVELOPMENT: The EU-15 over 1990-1994

	Private Bank Credit	Market Capitalization	Total Capitalization	Market Value Traded	Accounting Standards
Mean	0.86	0.31	1.35	0.13	0.64
Median	0.89	0.22	1.45	0.07	0.63
S.D. / Mean	0.38	0.80	0.33	0.94	0.20
Min	0.32	0.10	0.51	0.03	0.36
Max	1.41	0.97	2.25	0.45	0.83
Min Country	Greece	Austria	Greece	Greece	Portugal
Max Country	Netherlands	UK	UK	UK	Sweden
Ν	12	12	12	12	12

# FINANCIAL DEVELOPMENT and GROWTH: Age Quintile Groups

	Private Bank Credit	Market Capitalization	Total Capitalization	Market Value Traded	Accounting Standards			
Absolute Measure of Age								
FD * Age Q1	-0.006	0.011	0.000	0.018	0.019			
FD * Age Q2	0.016	0.021***	0.009	0.044***	0.060			
FD * Age Q3	0.035**	0.039***	0.025***	0.075***	0.139***			
FD * Age Q4	0.022***	0.018***	0.014***	0.035***	0.081***			
Age Q1	0.041***	0.033***	0.036***	0.034***	0.024			
Age Q2	0.016*	0.022***	0.017**	0.023***	-0.010			
Age Q3	-0.010	0.005	-0.016***	0.007**	-0.074**			
Age Q4	-0.014**	-0.003	-0.015**	-0.001	-0.051***			
N	14,874	14,874	14,874	14,874	14,874			
R <sup>2</sup>	0.12	0.12	0.12	0.12	0.12			
		Relative Measure	e of Age					
FD * Age Q1	-0.003	0.013*	0.002	0.021	0.023			
FD * Age Q2	0.013	0.022***	0.011*	0.044***	0.054			
FD * Age Q3	0.040***	0.041***	0.025***	0.081***	0.141***			
FD * Age Q4	0.027***	0.021***	0.016***	0.043***	0.093***			
Age Q1	0.041***	0.035***	0.036***	0.036***	0.024			
Age Q2	0.020*	0.023***	0.015	0.024***	-0.006			
Age Q3	-0.011	0.006	-0.015**	0.008**	-0.074**			
Age Q4	-0.016**	-0.001	-0.017**	0.000	-0.056***			
Ν	14,874	14,874	14,874	14,874	14,874			
R <sup>2</sup>	0.12	0.12	0.12	0.12	0.12			







# FINANCIAL DEVELOPMENT AND GROWTH: Size Quintile Groups

	Private Bank Credit	Market Capitalization	Total Capitalization	Market Value Traded	Accounting Standards
		Absolute Measur	e of Size		
FD * Size Q1	-0.022	-0.005	-0.007	0.017	-0.038
FD * Size Q2	-0.022	-0.008	-0.009	-0.005	-0.062
FD * Size Q3	-0.019	-0.006	-0.006	-0.009	-0.046
FD * Size Q4	-0.007	0.001	-0.001	0.003	-0.015
Size Q1	0.102***	0.086***	0.094***	0.081***	0.109
Size Q2	0.056**	0.041***	0.050***	0.039***	0.079*
Size Q3	0.036**	0.022***	0.028**	0.021***	0.051*
Size Q4	0.013*	0.007**	0.009	0.006**	0.017
Ν	14,740	14,740	14,740	14,740	14,740
R <sup>2</sup>	0.20	0.20	0.20	0.20	0.20
		Relative Measure	e of Size		
FD * Size Q1	-0.029	-0.008	-0.009	0.004	-0.054
FD * Size Q2	-0.020	-0.008	-0.007	-0.006	-0.048
FD * Size Q3	-0.018	0.000	-0.005	-0.002	-0.031
FD * Size Q4	-0.006*	0.003	0.000	0.002	-0.010
Size Q1	0.105***	0.084***	0.094***	0.081***	0.118*
Size Q2	0.052**	0.039***	0.047***	0.037***	0.068
Size Q3	0.035***	0.021***	0.028**	0.021***	0.041*
Size Q4	0.010***	0.004**	0.005	0.004**	0.012
Ν	14,740	14,740	14,740	14,740	14,740
R <sup>2</sup>	0.20	0.20	0.20	0.20	0.20





#### FINANCIAL DEVELOPMENT AND GROWTH: Age and Size Quintile Groups

	Private Bank	Market	Total	Market Value	Accounting
	Credit	Capitalization	Capitalization	Traded	Standards
	Abso	olute Measures of	Age and Size		
FD * Age Q1	-0.004	0.009**	0.002	0.010	0.009
FD * Age Q2	0.013**	0.015***	0.007**	0.030***	0.044**
FD * Age Q3	0.020**	0.023***	0.015***	0.042***	0.088***
FD * Age Q4	0.010**	0.007**	0.007**	0.014**	0.040***
FD * Size Q1	-0.020	-0.007	-0.007	0.013	-0.038
FD * Size Q2	-0.021	-0.010	-0.009	-0.008	-0.065
FD * Size Q3	-0.018	-0.008	-0.006	-0.011	-0.050
FD * Size Q4	-0.008	-0.001	-0.002	0.002	-0.019
Age Q1	0.027***	0.020***	0.020***	0.022***	0.018
Age Q2	0.006	0.012***	0.007*	0.012***	-0.013
Age Q3	-0.007	0.001	-0.011**	0.003	-0.050***
Age Q4	-0.007*	-0.002	-0.008**	-0.001	-0.026***
Size Q1	0.100***	0.086***	0.094***	0.082***	0.110
Size Q2	0.057**	0.043***	0.052***	0.040***	0.082*
Size Q3	0.036**	0.023***	0.030**	0.022***	0.054*
Size Q4	0.014**	0.008**	0.011*	0.007**	0.020
Ν	14,874	14,874	14,874	14,874	14,874
R <sup>2</sup>	0.21	0.21	0.21	0.21	0.21

#### UNDERSTANDING THE RESULTS FOR THE YOUNGEST FIRMS

- If startups in low FD economies expect that in their early years it may be hard to raise external finance, then they ought to get endowed with an unusually high amount of initial equity at incorporation.
- Our regression asks whether equity endowment differs for otherwise similar newly incorporated companies across low/high FD.
- In accord with the hypothesis, we find that conditional on the effect FD has on equity endowment of all firms, the age gradient of equity endowment is higher for low FD levels.

# FINANCIAL DEVELOPMENT AND EQUITY ENDOWMENT

	Private Bank Credit	Market Capitalization	Total Capitalization	Market Value Traded	Accounting Standards			
Newly Incorporated Firms								
FD * Incorporation	-0.047	-0.058**	-0.030	-0.136**	-0.106			
Incorporation	0.065**	0.047***	0.069**	0.046***	0.098			
Age	-0.100***	-0.100***	-0.100***	-0.100***	-0.100***			
N	14,740	14,740	14,740	14,740	14,740			
R <sup>2</sup>	0.14	0.14	0.14	0.14	0.14			

# FINANCIAL DEVELOPMENT AND EQUITY ENDOWMENT

	Private Bank	Market	Total	Market Value	Accounting
	Credit	Capitalization	Capitalization	Traded	Standards
FD * Age Q1 * Low EE	0.016	0.035***	0.010*	0.079***	0.017
FD * Age Q2 * Low EE	0.018**	0.024**	0.011**	0.051**	0.022**
FD * Age Q3 * Low EE	0.001	0.003	0.000	0.007	-0.004
FD * Age Q4 * Low EE	-0.001	-0.003	-0.000	-0.006	-0.004
FD * Age Q1	-0.015	-0.002	-0.004	-0.011	0.006
FD * Age Q2	0.003	0.007	0.002	0.016	0.029
FD * Age Q3	0.032**	0.035***	0.024***	0.067***	0.139***
FD * Age Q4	0.021***	0.020***	0.014***	0.038***	0.085***
Age Q1	0.045***	0.034***	0.038***	0.035***	0.030
Age Q2	0.022**	0.024***	0.022***	0.024***	0.005
Age Q3	-0.007	0.005	-0.014***	0.008**	-0.074**
Age Q4	-0.013**	-0.003	-0.015**	-0.001	-0.052***
Low EE	0.007**	0.009***	0.007***	0.009***	0.008***
Ν	14,874	14,874	14,874	14,874	14,874
R <sup>2</sup>	0.12	0.12	0.12	0.12	0.12

#### **ROBUSTNESS CHECKS:** Results not sensitive to:

- Dropping firm-level controls in within-industry regressions (unobservables).
- Controlling for the interaction of intangibles with financial development.
- Using industry-country dummies.
- Using Financial Development indicators for 1995-1998.
- Dropping Greece.
- Using alternative definitions of the dependent variable.
- Using median firms as the base group.
- Using median regression (with bootstrapped standard errors).
- Using two-stage estimation methods instead of clustering.

#### **CAVEATS: FIRM ENTRY AND EXIT SELECTION BIASES**

#### We look at growth *conditional* on entry

But a poor financial system may prevent entry of profitable firms.

- 1. So unobservables of entrants may differ across countries, leading to *underestimation* of our interactions.
- 2. No problem if growth potential is captured by size at entry (as in Beck & Demirguc-Kunt, 2006).
- 3. We use TOP250 so TOAS>20 million Euro or employment > 100.

#### What about selective exit?

- 1. We use median or mean growth rates.
- 2. Increasing sample selection changes results little.
- 3. So does including firms with less than 5 years of data.

# CONCLUSIONS

- We apply the Rajan-Zingales strategy at firm level in the EU-15.
- We uncover the finance-growth mechanism related to a fundamental source of external finance costs: information asymmetry.

# **Findings**

- No difference in the effect of FD by firm size.
- But an inverted-U age difference.
- Entrants in low FD countries enter with "extra" equity endowment.

#### Age inverted-U effect consistent with

- information asymmetry story (e.g., banking relationships);
- freshly incorporated firms don't need (more) external finance.

# **Policy implications**

- Smaller companies do not have unusual growth opportunities that are not realized because of financial markets.
- Support young firms! Especially *if they are small*.

#### EU-15: Firm Age Distribution



# EU-15: Firm Age Distribution by Country



#### EU-15: Firm Size Distribution



# EU-15: Firm Size Distribution by Country



Size: Total assets in USD millions (initial period)

#### **EVIDENCE ON SMALL FIRMS: LITERATURE**

### Industry-level: Beck et al. (2004)

- An interaction between country financial development and industry indicators of being 'naturally' composed of smaller firms.
- Industry size measured as share of US firms with less than 20 workers.
- All within-industry size variation lost.
- Industry average growth includes very small and very large firms.
- The same size threshold (20 workers) in all industries affects constraints.
- Would industry size structure be the same across countries in absence of financial system differences?

#### Survey Data: Beck et al. (2005, 2006)

- World Bank Environment Survey (WBES) data.
- Larger, older, and foreign-owned firms report lower financing obstacles.
- But firms that fail to grow and remain small (e.g., because of management failure) may blame financial intermediaries.

#### FINANCIAL DEVELOPMENT AND GROWTH: Age and Tangibility Groups

	Private Bank	Market	Total	Market Value	Accounting
	Credit	Capitalization	Capitalization	Traded	Standards
	Abso	olute Measures of	Age and Size		
FD * Age Q1	-0.000	0.016***	0.006	0.023	0.025
FD * Age Q2	0.018	0.021***	0.011*	0.043***	0.042
FD * Age Q3	0.036***	0.035***	0.024***	0.069***	0.108**
FD * Age Q4	0.025**	0.020***	0.016***	0.040***	0.070**
FD * Tangibility Q1	0.021*	0.011**	0.014***	0.028**	0.061
FD * Tangibility Q2	0.025***	0.015*	0.014**	0.025*	0.057***
FD * Tangibility Q3	0.027*	0.020**	0.016***	0.042***	0.039
FD * Tangibility Q4	0.025***	0.016**	0.011***	0.033**	0.040
Age Q1	0.033***	0.028***	0.025**	0.030***	0.016
Age Q2	0.011	0.019***	0.011	0.019***	-0.002
Age Q3	-0.014	0.003	-0.019**	0.005	-0.056*
Age Q4	-0.019**	-0.006	-0.021***	-0.005	-0.045**
Tangibility Q1	-0.019**	-0.005	-0.020***	-0.006	-0.041
Tangibility Q2	-0.032***	-0.017**	-0.031***	-0.016**	-0.049***
Tangibility Q3	-0.033**	-0.018**	-0.034***	-0.017**	-0.037
Tangibility Q4	-0.029***	-0.014**	-0.025***	-0.014**	-0.035
Ν	16,770	16,770	16,768	16,770	16,768
R <sup>2</sup>	0.10	0.10	0.10	0.10	0.10

# FINANCIAL DEVELOPMENT AND GROWTH: Age Groups by Firm Size

	Private Bank	Market	Total	Market Value	Accounting				
	Credit	Capitalization	Capitalization	Traded	Standards				
	Absolute Measures of Age and Size								
FD * Age Q1 * Small	0.008	0.029***	0.011*	0.062***	0.029				
FD * Age Q2 * Small	0.024	0.030***	0.015***	0.070***	0.064				
FD * Age Q3 * Small	0.028**	0.029***	0.020***	0.062***	0.105***				
FD * Age Q4 * Small	0.011	-0.002	0.006*	0.001	0.055***				
FD * Age Q1 * Big	-0.022*	-0.012	-0.006	-0.034*	-0.017				
FD * Age Q2 * Big	0.007	0.008*	0.005	0.017**	0.036				
FD * Age Q3 * Big	0.024**	0.033***	0.019***	0.057***	0.096**				
FD * Age Q4 * Big	0.021***	0.023**	0.013***	0.042***	0.063***				
Age Q1	0.036***	0.027***	0.027***	0.028***	0.027				
Age Q2	0.011	0.016***	0.009	0.017***	-0.010				
Age Q3	-0.009	0.000	-0.015***	0.002	-0.055**				
Age Q4	-0.012**	-0.004	-0.013**	-0.003	-0.038***				
Big	-0.037***	-0.041***	-0.037***	-0.040***	-0.034***				
Ν	14,874	14,874	14,874	14,874	14,874				
R <sup>2</sup>	0.21	0.21	0.21	0.21	0.21				

#### FINANCIAL DEVELOPMENT AND GROWTH: Age and Size Quintile Groups

	Private Bank	Market	Total	Market Value	Accounting
	Credit	Capitalization	Capitalization	Traded	Standards
	Rela	ative Measures of A	Age and Size		
FD * Age Q1	0.003	0.013***	0.006*	0.021**	0.023
FD * Age Q2	0.011	0.018***	0.010***	0.035***	0.041
FD * Age Q3	0.030***	0.030***	0.019***	0.057***	0.107***
FD * Age Q4	0.016***	0.011**	0.010***	0.023**	0.053***
FD * Size Q1	-0.027	-0.012	-0.010	-0.004	-0.057
FD * Size Q2	-0.018	-0.011	-0.008	-0.010	-0.051
FD * Size Q3	-0.018	-0.002	-0.006	-0.006	-0.037
FD * Size Q4	-0.007**	0.001	-0.001	-0.001	-0.013
Age Q1	0.022***	0.020***	0.016***	0.022***	0.009
Age Q2	0.009	0.012***	0.004	0.013***	-0.009
Age Q3	-0.013**	0.000	-0.015***	0.002	-0.060***
Age Q4	-0.011**	-0.001	-0.011**	-0.001	-0.033***
Size Q1	0.104***	0.086***	0.096***	0.082***	0.120*
Size Q2	0.052***	0.040***	0.048***	0.038***	0.070*
Size Q3	0.036***	0.022***	0.030**	0.022***	0.046*
Size Q4	0.012***	0.005***	0.007**	0.005**	0.014
Ν	15,179	15,179	15,179	15,179	15,179
R <sup>2</sup>	0.21	0.21	0.21	0.21	0.21

# FINANCIAL DEVELOPMENT AND GROWTH: Linear Specification

	Private Bank Credit	Market Capitalization	Total Capitalization	Market Value Traded	Accounting Standards		
	Size: Acros	ss- and Within-Ind	lustry Compariso	ns			
FD * Size	0.003	-0.022***	-0.005	-0.025*	-0.041		
Size	-0.006	0.004	0.004	0.001	0.023		
Ν	15,040	15,040	15,040	15,040	15,040		
R <sup>2</sup>	0.11	0.11	0.11	0.11	0.11		
	Size:	Within-Industry (	Comparisons				
FD * Size	-0.033***	-0.061***	-0.026***	-0.100***	-0.070***		
Size	0.006*	0.003	0.009***	0.002	0.010***		
Ν	15,040	15,040	15,040	15,040	15,040		
R <sup>2</sup>	0.11	0.11	0.11	0.11	0.11		
	Age: Acros	s- and Within-Ind	ustry Compariso	ns			
FD * Age	0.042***	-0.002	0.019**	0.007	0.015		
Age	-0.104***	-0.065***	-0.095***	-0.067***	-0.077***		
Ν	15,040	15,040	15,040	15,040	15,040		
R <sup>2</sup>	0.11	0.11	0.11	0.11	0.11		
Age: Within-Industry Comparisons							
FD * Age	-0.099	-0.410**	-0.134	-0.548	-1.648***		
Age	-0.061***	-0.057***	-0.055***	-0.061***	-0.005		
Ν	15,040	15,040	15,040	15,040	15,040		
R <sup>2</sup>	0.11	0.11	0.11	0.11	0.11		

#### WITHIN- OR ACROSS-INDUSTRY COMPARISONS?

Firm-level analysis improves upon the industry-level

- Measure size (age) and growth precisely
- No need for RZ-style assumptions
- Use new sources of variation
- Compare results based on within- and across-industry size variation to discern the importance of firm-level unobservables.
- Measure growth of only firms of the industry-induced size.
- Discuss issues of firm survival and entry.

# FINANCIAL DEVELOPMENT and GROWTH: Across-Industry Size Variation

	Private Bank Credit	Market Capitalization	Total Capitalization	Market Value Traded	Accounting Standards
	All F	Firms, No Firm-Le	vel Controls		
FD * Industry Size	-0.674	-0.604	-0.336	-1.393	-2.284
N	15,179	15,179	15,179	15,179	15,179
R <sup>2</sup>	0.06	0.06	0.06	0.06	0.06
	All F	irms, with Firm-Lo	evel Controls		
FD * Industry Size	-0.468	-0.630	-0.319	-1.362	-2.111
Firm Size	-0.003*	-0.004*	-0.004***	-0.004*	-0.004*
Ν	15,040	15,040	15,040	15,040	15,040
R <sup>2</sup>	0.11	0.11	0.11	0.11	0.11
	Firms Near Indus	stry Median Size,	with Firm-Level C	Controls	
FD * Industry Size	-0.220	0.475	0.156	0.854	0.232
Firm Size	-0.748*	-0.732*	-0.742*	-0.729*	-0.745*
Ν	3,041	3,041	.3,041	3,041	3,041
R <sup>2</sup>	0.11	0.11	0.11	0.11	0.11
	Firms Near Indus	stry Median Size,	with Firm-Level C	Controls	
FD * Firm Size	0.082	0.801	0.505	1.280	0.989
Firm Size	-0.807	-0.987**	-1.426*	-0. 893**	-1.397
Ν	3,041	3,041	3,041	3,041	3,041
R <sup>2</sup>	0.11	0.11	0.11	0.11	0.11